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**Acceptability of Nurse-Driven HIV Screening for Key Populations in Emergency  
Departments: A Mixed Methods Study**

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### Abstract

**Background:** Optimizing care continuum entry interventions is key to ending the HIV epidemic. Offering HIV screening to key populations in emergency departments (EDs) is a strategy that has been demonstrated to be effective. Analyzing patient and provider perceptions of such screening can help identify implementation facilitators and barriers.

**Objectives:** To investigate the acceptability of offering nurse-driven HIV screening to key populations based on data collected from patients, nurses, and other service providers.

**Methods:** This convergent mixed methods study was a substudy of a cluster-randomized two-period crossover trial conducted in eight EDs to evaluate the effectiveness of the screening strategy. During the DICI-VIH (Dépistage Infirmier Ciblé du VIH, trial) trial, questionnaires were distributed to patients aged 18–64. Based on their responses, nurses offered screening to members of key populations.

Over 5 days during the intervention period in four EDs, 218 patients were secondarily questioned about the acceptability of screening. Nurses completed 271 questionnaires pre- and posttrial regarding acceptability in all eight EDs. Descriptive analyses were conducted on these quantitative data. Convenience and purposeful sampling was used to recruit 53 providers to be interviewed posttrial. Two coders conducted a directed qualitative content analysis of the interview transcripts independently.

**Results:** The vast majority of patients (95%) were comfortable with questions asked to determine membership in key populations and agreed (89%) that screening should be offered to key populations in EDs. Nurses mostly agreed that offering screening to key populations was well accepted by patients (62.2% pre- and 71.4% posttrial), easy to implement, and fell within the nursing sphere of competence. Pretrial, 73% of the nurses felt that such screening could be implemented in EDs. Posttrial, the proportion was 41%. Three themes emerged from the interviews: preference for targeted screening and a written questionnaire to identify key

populations, facilitators of long-term implementation, and implementation barriers. Nurses were favorable to such screening provided specific conditions were met regarding training, support, collective involvement, and flexibility of application to overcome organizational and individual barriers.

**Discussion:** Screening for key populations was perceived as acceptable and beneficial by patients and providers. Addressing the identified facilitators and barriers would help increase screening implementation in EDs.

*Keywords:* Emergency service, Hospital, HIV, mass screening, nurses, prevention and control, targeted screening

**Acceptability of Nurse-Driven HIV Screening for Key Populations in Emergency  
Departments: A Mixed Methods Study**

Despite substantial improvements in the management of the HIV care continuum over the past decades, undiagnosed HIV remains a public health concern. The Joint United Nations Programme on HIV/AIDS (UNAIDS) 2020 target of having 90% of the people living with HIV (PLHIV) diagnosed remains a tall order in France and globally (Centers for Disease Control and Prevention, 2020; Vourli et al., 2020). Early HIV detection, linkage to care, and treatment result at the individual level in decreased mortality (Cohen et al., 2016; Lundgren et al., 2015). One of the most important consequences of early HIV diagnosis and access to treatment is epidemic control at the community level, as virally suppressed PLHIV does not transmit HIV infection (Rodger et al., 2019). The strategy of test and treat is believed to have played a role in the lower number of new diagnoses recently observed in several countries.

Health care-based HIV screening is a key component in reaching individuals with undiagnosed infection and eliminating transmission. The first recommendations formulated in this regard, in 2006 in the United States, encouraged implementation of nontargeted strategies in health services not specializing in screening. Recommendations along these lines were adopted in France in 2010. Emergency departments (EDs) were one of the main services involved. However, nontargeted screening in EDs had yielded mixed results in the past, which probably dampened provider engagement (d'Almeida et al., 2012; Tai & Merchant, 2014). In addition, implementation of screening is heavily dependent on both patient acceptability and provider adherence to recommendations, which remains a major challenge (White et al., 2016). As the epidemic has grown increasingly concentrated, international guidelines have shifted their focus to risk-based screening (World Health Organization, 2018).

In France, as in many other countries, HIV incidence and undiagnosed HIV prevalence are heterogeneous across populations and geographical areas (Marty et al., 2018). The Paris metropolitan area is one of the country's most affected regions. New infections and undiagnosed infections there remain high. Men who have sex with men and people from countries where the epidemic is generalized are among the most affected populations. Such a situation calls for tailored screening interventions. The DICI-VIH (Dépistage Infirmier Ciblé du VIH) trial was conducted to evaluate the benefits of nurse-driven HIV screening for key populations in eight EDs of the Paris metropolitan area. The screening strategy was found to be effective and cost-effective (Leblanc et al., 2017). Since 2017, French health authorities have recommended implementing HIV screening in EDs for those key populations (Haute Autorité de Santé, 2017).

This strategy has been evaluated in other countries where the HIV epidemic has been concentrated in key populations. However, results have been mixed (Gillet & Darling, 2018; Haukoos et al., 2013; Haukoos et al., 2017; Lyons et al., 2013). Most of the studies carried out have been single-center, and none has evaluated the strategy's acceptability. In addition, implementation facilitators and barriers have been explored only for the nontargeted screening approach (Elgalib et al., 2017; Leblanc et al., 2015). Yet, a better understanding of the acceptability among patients and service providers of the screening strategy targeting key populations is essential to identify the factors that might contribute to successful implementation and ensure large-scale deployment over the long term.

The purpose of this study was to investigate the acceptability of nurse-driven HIV screening for key populations in EDs through the perceptions of patients, nurses, and other ED service providers.

## **Methods**

### **Design**

This convergent mixed methods study was a substudy of the DICI-VIH cluster-randomized two-period crossover trial (Creswell & Creswell, 2017). The DICI-VIH trial was conducted in eight EDs of the Paris metropolitan area to compare nurse-driven HIV screening for key populations combined with diagnostic testing (intervention period) against diagnostic testing alone (control period). The eight EDs received approximately one quarter of the adult ED patients in the area (CREU, 2015). The methods, the primary outcome findings, and factors quantitatively affecting feasibility have been described elsewhere (Leblanc et al., 2019; Leblanc et al., 2017; Leblanc et al., 2016). Based on sample size calculations, 70,000 ED visitors ages 18 to 64 were required per period.

During the intervention period, a print copy DICI-VIH questionnaire was distributed 24 hours a day at registration to patients aged 18–64 after verbal opt-out consent was obtained. Additionally, the nurse suggested rapid HIV testing if patients reported belonging to a key population, namely being from or having had partners from a country where HIV is endemic or having a history of male-to-male sexual contact. During the intervention period from June 2014 to June 2015, 74,161 patients aged 18–64 visited the participating EDs. Of these, 16,468 patients completed the DICI-VIH questionnaire and returned it to the triage nurse. Of these, 4,341 belonged to high-risk groups, and 2,818 consented to a rapid HIV test performed by a nurse.

For the purposes of this substudy, patients in four EDs were administered a supplemental questionnaire during the intervention period of the trial to collect their perceptions and evaluation of the strategy. These patients constituted the patient sample. Also, nurses in eight EDs were asked to describe their assessment of the strategy before and after implementation and the possibility of posttrial implementation of screening. These nurses constituted the nurse sample. Quantitative data were collected from both patients and nurses.

Finally, using a qualitative approach, service providers in the eight EDs who were involved in the strategy were interviewed at the end of the intervention period to gain some insight into the facilitators and barriers to consider for further implementation. These service providers constituted the provider sample (Figure 1).

## **Participants**

### ***Patient Sample***

During 5 consecutive days of the intervention, all patients in four EDs (two in inner Paris, two in suburban areas) who participated in the trial intervention were secondarily approached between 9 a.m. and 5 p.m. by a clinical research nurse (CRN) or an assistant at the end of nurse triage (Figure 1). After providing verbal consent, patients completed a questionnaire about the acceptability of the screening strategy, including completing the DICI-VIH questionnaire about membership in key populations and possibly undergoing a rapid HIV screening test performed by a triage nurse. Patients were given the option of self-administering the questionnaire or having the CRN read the questions aloud in a place reserved for the purpose and record their answers. All patients agreed to complete the questionnaire. As this was an exploratory substudy, sample size calculations were not done.

### ***Nurse Sample***

Prior to the intervention period of the DICI-VIH trial, nurse teams participated in training sessions. At the end of training in each ED, all nurses were approached by the study coordinator (JL) or a CRN and all provided verbal consent to complete, in the training room, a short pretrial questionnaire about the acceptability of the screening strategy. At the end of the DICI-VIH trial intervention period, the same sample of nurses was invited by a CRN to complete a posttrial questionnaire similar to the first one. Because of turnover and vacations, however, some nurses were not on hand. Only some of the missing nurses were replaced by others who participated in the trial.

### *Provider Sample*

At the end of the intervention period, a combination of convenience and purposeful sampling was used to recruit ED service providers to participate in semistructured interviews. The study coordinator and the nurse investigator in each ED selected participants to reflect the diversity of staff involved in the trial. Participants included, per ED, at least three nurses, a physician, and a nurse manager who participated in or supervised the screening process and later a nurse assistant, an ED administrative staff member, and a nurse hospital director. Everyone provided verbal consent to participate.

### **Data Collection**

#### *Patient Sample*

A nine-item questionnaire was developed by the authors (JL, HF, A-CC ) based on the literature (Centers for Disease Control and Prevention, 2012; Hecht et al., 2011; Leblanc et al., 2015) in the absence of a validated questionnaire applicable in this specific context (see Supplemental Digital Content 1). Experts from various disciplines proceed to a content evaluation of the questionnaire. The questionnaire evaluated perceptions regarding completion of the DICI-VIH questionnaire, HIV screening in EDs, and, if applicable, the offer of rapid HIV testing and notification of test results. Six items were *yes/no* and led to subquestions (if applicable), two items were rated on a 5-point Likert scale, and one item was an open-ended question.

#### *Nurse Sample*

Before the intervention, nurses filled out a questionnaire on acceptability. After the intervention, they completed the same questionnaire but with an added question on their general participation. Pre- and posttrial questionnaires could not be matched by an identification number owing to a feasibility issue. In the absence of a validated questionnaire, the authors (JL, JC, A-CC) developed a self-administered, 14-item hardcopy questionnaire

based on a previous survey and the literature (Arbelaez et al., 2012; Centers for Disease Control and Prevention, 2012; Leblanc et al., 2012) (see Supplemental Digital Content 2). Content validation was carried out. The questionnaire covered demographics (4 questions) and previous HIV screening experience (2 questions) and included an open-ended comment section. Views on the nurses' roles in screening, the screening process, and posttrial implementation of screening in EDs were rated on a 5-point Likert scale (7 questions).

### ***Provider Sample***

Individual semistructured interviews were conducted with ED service providers using an interview guide developed by the authors (JL, JC, A-CC) based on a previous survey (Leblanc et al., 2012). The guide comprised questions regarding demographics, individual and team involvement in the screening strategy, perceptions of the screening and its long-term implementation, and implementation facilitators and barriers. Interviews were conducted in French in the EDs by a PhD nurse (JL) with previous qualitative research experience. They lasted on average 24 min (min–max: 10–49). Interviews were digitally recorded and subsequently transcribed.

The trial was approved by the Ile-de-France XI Committee for Patient Protection and by the French Data Protection Authorities. A waiver of consent was granted; as such, participants did not individually provide written informed consent.

### **Data Analysis**

Descriptive analyses were performed on the quantitative data obtained from the patient and nurse samples. Categorical variables are reported as numbers and percentages, and continuous variables as medians and interquartile ranges (IQR). In the nurse sample, each item rated on a Likert scale was analyzed as ordinal data. For exploratory purposes, mixed models were used to compare the pre- and posttrial questionnaires' responses taking into account data clustering by ED. Other variables, including baseline characteristics, were

compared using mixed models with distribution adapted to variable type. Missing data were not imputed. All tests were two-sided, with statistical significance set at  $p < .05$ . Quantitative analyses were performed using SAS® software, Version 9.4 (SAS Institute Inc., Cary, NC, USA), and R freeware version 3.5.1 (R Core Team, 2021).

For the qualitative data collected from the provider sample, two coders (PA, JL) independently conducted the directed content analysis using a deductive, iterative analysis process (Denzin & Lincoln, 2011; Hsieh & Shannon, 2005). Interviews were coded using a thematic coding tree generated by JL based on the interview guide and then refined by coders. Analysis and discussion cycles allowed extracting themes and subthemes using a narrative text. The research team revised a synthesis document. Qualitative data were analyzed using NVivo 11 (NVivo, 2015).

Quantitative and qualitative findings were integrated narratively at the data interpretation level in the discussion section of this paper. In addition, quantitative and qualitative findings were drafted together using a theme-by-theme approach (Fetters et al., 2013).

## Results

### Sample Descriptions

Of the 573 patients in four EDs who filled out the DICI-VIH hardcopy questionnaire in the 5-day period during the intervention, 218 (38.9%; median age: 31.6 years, IQR: 24.6-45.2), including 90 women (42.7%), were approached by CRNs and completed the acceptability questionnaire (Figure 2). Of these 218, 70 (32.1%) belonged to a key population. Among them, 68 (97.1%) were offered HIV testing; 50 (73.5%) agreed to be tested. Overall, 191 patients (87.6%) were interested in participating in a trial on HIV screening. The vast majority (205/217, 94.5%) were not put off by the DICI-VIH questionnaire. A large majority also felt that these questions could be asked out loud by a

nurse (189/217, 87.1%) or a physician (200/217, 92.2%). All tested patients were satisfied with the test offered by a nurse, and the wait time for results was considered acceptable (46/49, 93.9%). Most of those patients felt that it is appropriate for nurses to notify negative results (46/48, 95.8%) or reactive results (40/49, 81.6%). A third (16/48, 33.3%) indicated that they would not have been tested later otherwise. Overall, 191 patients (88.4%) believed that screening should be offered to key populations in EDs (See Supplemental Digital Content 3).

Nurses completed 271 questionnaires, 144 before the intervention and 127 after. The median age of nurses was 30 years (IQR: 26–35); 204 were women (Figure 2, Table 1). In 264 questionnaires (97.4%), nurses agreed that the trial objectives were clear (Figure 3). Pretrial, nurses mostly agreed that offering targeted screening would be well accepted by patients (89/143, 62.2%). Posttrial, 71.4% (90/126) agreed so. Nurses also mainly agreed that offering targeted screening (255/271, 94.1%) and performing rapid testing (265/271, 97.8%) fell within their field of competence. However, in half of the questionnaires, nurses agreed that notifying test results to patients, whether the results were negative or positive, also fell within their field of competence (131/269, 48.7%). In 65.4% (176/269) of the questionnaires, nurses considered HIV screening for key populations easy to implement. Results did not differ between the pre- and posttrial groups for any of the questions (NS) except regarding subsequent implementation of screening as routine practice. Pretrial, 104 participants (72.7%) agreed that screening could be implemented later; posttrial, only 51 did (40.8%; OR: 0.59; 95% CI 0.37, 0.92, posttrial vs. pretrial questionnaires).

Of the 53 provider participants recruited, 28 (52.8%) were nurses and 40 (75.5%) were women. The group's median age was 37 (IQR: 31–44) years (Figure 2, Table 1). Three major themes emerged: preference for targeted screening and a written questionnaire to identify key populations, facilitators of long-term implementation, and implementation

barriers.

### **Preference for Targeted Screening and a Written Questionnaire to Identify Key Populations**

The service providers interviewed were in favor of screening for key populations. Both the nurses and the other providers were comfortable with this new strategy of screening. Providers preferred targeted to nontargeted screening because it seemed simpler, faster, more effective, and better adapted to practice in EDs. Furthermore, providers advanced that targeted screening allowed focusing efforts more efficiently.

Targeted screening is easier (...) You might not be at risk and still get flagged, but there's less of a chance of that happening (...) if you target, it's also to obtain a better detected-to-screened ratio (...) it was set up well enough to be accepted. (45-year-old female, nurse manager).

Some participants underscored that nontargeted screening, instead, allowed practice to be systematized and limited the potential awkwardness caused by questioning on risk factors, particularly ethnic background and sexual activity, specifically regarding male-on-male sexual contact. Some caregivers feared stigmatizing people by broaching these subjects. Others were ill at ease, which may have been due to the embarrassment expressed by a small number of patients. Nurses presented nontargeted screening as an unattainable ideal. They also pointed out that it was crucial for targeting to be done with tact.

The majority of participants estimated that a hard copy questionnaire was more appropriate than reading questions out loud, as it afforded patients greater privacy and allowed caregivers to save time and spared them awkward moments. Participants also suggested using an electronic version of the questionnaire that patients could complete at a station or on their smartphones.

The two methods [hardcopy and questionnaire read out loud] are interesting. The problem is that it eats up a lot of time when you administer the questionnaire [out loud]. When patients (...) wait for two or three hours, they can fill out the questionnaire. It might make them think about (...) their

responses. (...) I'm more in favor of the hard copy. (46-year-old female, nurse manager)

### **Facilitators of Long-Term Implementation**

The providers mentioned various positive and motivational elements that facilitated the procedure. As a result, they considered that the EDs could continue to conduct targeted screening.

### ***Compatibility with ED Practice and Missions Depends on Individual and Collective***

#### ***Engagement***

The screening procedure was perceived as easy to implement after a short period of adaptation but hinged on caregiver engagement.

I didn't find all that difficult (...) easy enough to hand out the questionnaires at the reception and do the testing (...) just a question of wanting to do it. (34-year-old female, nurse manager).

The dynamics of a multidisciplinary team, including physicians, nurse managers, and nurse assistants, would create the emulation effect required for the procedure to work.

Screening is also part of the service culture (...). The moment you see that various people are engaged, there's a snowball effect; people follow the lead. (36-year-old female, physician).

HIV screening fits in with the missions of nurses with expertise in prevention. They were perceived as the most legitimate professionals for an activity considered to be gratifying. It also fits in with the prevention and public health missions of EDs. According to nearly all of the providers interviewed, EDs played a role for these subjects though they lacked the time to fulfil it and it did not always seem to be encouraged by management.

Prevention is the entire hospital's business. Especially the ED, prevention of everything, HIV (...).

Prevention is our thing, more so in EDs than in other departments." (53-year-old female, nurse manager).

### ***Usefulness and High Acceptability***

The perception that caregivers had of the clinical utility of screening and its benefits in terms of public health, like the high patient acceptability, was a key driver. In addition,

positive reactions from patients contributed to tightening caregiver embrace of screening.

One patient said to me [I think it's great (...) screening is important]. When patients are on board, it's really motivating. (27-year-old female, nurse).

ED HIV screening was a service offering that allowed reaching people who were less easy to reach.

EDs are a means of netting people (...) who are not in the regular health care system, who don't have access to it on account of their status. (36-year-old female physician).

### ***Prerequisites: Flexibility, Training, and Support***

It would be easier to implement screening over the long term if it could adapt to the ED's operational organization, especially during peak hours. It was also suggested that screening activities be moved down the care trajectory from the triage zone to the consultation and care station. The integration of screening into practice also depended on the training of teams and future professionals and management teams providing support and sustained encouragement.

Competence is (...) I learned to do it, I'm good at it, someone told me so (...) it requires training, be covered in initial nurse training (...) it requires support (...). [Notifying negative results] requires knowing what to say (36-year-old male, nurse manager).

### **Implementation Barriers**

At the start of the trial intervention period, some providers expressed apprehension about how screening would be organized and about the additional workload it would entail. In addition, some providers indicated demotivational factors or perceived barriers to its implementation over the long term. Again, these had to do with how screening would be organized or with nurse comfort level with HIV screening.

### ***Tight Work Environment and Complexity of Combined Participation of Professionals***

Screening added to an already dense workload and its application could prove complex when short on time and during swells in patient flow. Additionally, screening

depended on the combined engagement of professionals at different points in the patient care management process (i.e., reception staff, nurse, physician). Weak collective engagement or variability in its level would affect the motivation of the personnel groups and limit application possibilities. The problems that EDs must deal with regularly regarding care staff shortages could also work against the screening procedure.

(...) in actual fact, I realize that it's more complicated than it sounds because there's an added dimension of motivation, workload and patient flow management. (34-year-old female, nurse manager).

### ***Screening a Lower Priority and Resistance to Change***

For some professionals, screening was perceived as a low priority. The problem lay in the fact that staff was being asked to juggle emergency care with prevention. Resistance to change might also work against the long-term application of the screening activity. Some providers pointed out the tendency among some caregivers to resist innovation in practice.

Not an easy thing to implement (...) we're there for emergencies and, at the same time, we're doing prevention. We're focused on emergencies and, at the same time (...), we being asked to set aside the emergency and shift into prevention mode to discuss HIV with patients. This switch, this shift in state of mind and in discourse, is hard to pull off. (25-year-old male, nurse).

### ***Caregivers Uncomfortable With the Procedure and Notification of Positive Test Results***

For some providers, the implementation of screening could be limited because some people were uncomfortable dealing with HIV, given that it remained a particular disease and a delicate subject to address. Some professionals also indicated feeling uncomfortable with the potential lack of confidentiality regarding the questionnaire and the likelihood that patients would not answer questions truthfully. Providers were also apprehensive about having to notify patients of positive test results. Only one third was in favor of nurses being the ones to make such a notification. The other two thirds proposed that notification be made jointly by a physician and a nurse or by a physician alone.

“Barriers (...) have more to do with staff members, on how they feel about it, whether they’re comfortable proposing it (...) notifying results (...) doing screening.” (36-year-old female, physician).

In summary, following implementation of an HIV screening program for key populations in eight EDs, patients and providers were mainly supportive of the strategy as such screening fell within the scope of ED and nurse missions. From the nurses’ and providers’ perspectives, key drivers of strategy implementation depended on various individual, team-based and organizational aspects: individual and collective engagement of nurses and other service providers towards the new practice; perceived utility and added value of screening for patient health; integration of screening within the workflow in a busy work environment where competing demands and priorities must be weighed; a perceived nursing professional role for the screening activity; quality of team-based environment and individual, collective, and organizational capacity to change. Furthermore, nurses and other providers mentioned that resources such as training and support were vital elements to ensure successful implementation of this new practice in EDs.

### **Discussion**

There has been growing interest in recent years in offering targeted HIV screening to key populations in nonspecialized health care settings. As a result, it has become crucial to identify the facilitators of and barriers to implementing such screening. During the DICI-VIH trial, the targeted screening strategy under investigation proved highly acceptable among patients, including members of the key populations concerned. Patients were not put off by the screening questions asked and were in favor of such screening being offered in EDs. Nurses, too, found the targeted screening strategy to be highly acceptable. Moreover, they perceived it as simple to apply and believed it fell within their scope of competence. Most ED service providers deemed targeted screening to be more appropriate than nontargeted screening. In addition, they had a favorable perception of its long-term implementation.

However, success in this regard would require training, support, collective involvement, and flexibility of application to overcome barriers. We found that our quantitative and qualitative findings could be integrated under three thematic headings:

1. Acceptability of screening strategy for key populations;
2. EDs: An opportunity for HIV screening despite implementation barriers; and
3. Nurse contribution to long-term implementation.

### **Acceptability of Screening Strategy for Key Populations**

One significant finding of the study points out that patients are comfortable with the targeted strategy and with the questions asked to determine eligibility for screening, whether the questions were on paper or administered verbally, and regardless of the ED service provider involved, be it physician or nurse. This must be read in connection with the fact that the vast majority of patients in the trial agreed to complete the questionnaire: 16,468 out of 17,727, 92.9% (Leblanc et al., 2017). This flies in the face of conventional wisdom to the effect that patients are reluctant to answer questions about HIV risk factors. More generally, studies of targeted screening have reported high levels of patient participation (Elmahdi et al., 2014). However, the acceptability of HIV risk assessment questionnaires had not been examined in depth or explored qualitatively in the literature.

Our findings based on the quantitative data collected from the nurse sample, and the qualitative data collected from the provider sample concur. ED service providers perceived the offer of targeted screening to be highly acceptable to patients. Only a few providers mentioned that patients or providers might not be comfortable with some questions. This issue has already been documented within the contexts of HIV infection and sexuality (Bokhour et al., 2015; de Munnik et al., 2017). However, it is also known that barriers are more prevalent among providers than among patients (Hecht et al., 2011). ED nurses could misunderstand how patients experienced screening by assuming that patients were less

comfortable and less satisfied with screening than patients reported (White et al., 2016). Still, concerns with offending patients can remain a barrier to screening. More specifically, most providers in this study recommended that patients answer questions on paper rather than verbally whereas, in other studies, the questions for determining membership in key populations were read out by nurses or counselors (Haukoos et al., 2013; Lyons et al., 2013). The choice of method should be based on a feasibility assessment and staff preferences as verbal administration of questions can be complex.

In the present study, patients expressed high acceptability regarding the subsequent stages of the screening process, including the test offer and results notification. Nevertheless, providers expressed concerns regarding notification of positive test results by nurses, suggesting that the task should be shared with other medical team members. This issue has been documented previously (Leblanc et al., 2015) and is tied in the French context to the innovative nature of the HIV screening activity for nurses.

Overall, the providers surveyed perceived the screening approach targeting key populations to be feasible and preferred it to a nontargeted approach. Gaining a better understanding of the diversity of risk factors and focusing strategies on populations disproportionately affected by HIV are objectives that have been recently included in the treatment-as-prevention strategy (Baral et al., 2019). Furthermore, efforts are being made nowadays to analyze data for the HIV continuum of care by key populations in order to determine more clearly where additional intervention is needed (Brown et al., 2018). This context encourages the adoption of targeted approaches to offer screening and avoid underserving those at the highest risk and exacerbating disparities between at-risk populations and the general population.

### **EDs: An Opportunity for HIV Screening Despite Implementation Barriers**

According to the patients surveyed, the offer of HIV screening in EDs represents a

convenient opportunity to be tested. It is important to note that one third of the patients tested in this study would not otherwise have gone for testing later. For a majority of providers, the utility and benefits of such screening in EDs are undeniable; only some providers expressed concern that screening should not be part of their core mission, given their high patient-volume environment. EDs seem to play a more prominent role in HIV screening than other departments relative to the population served, whose contact with health facilities may be irregular (Cullen et al., 2019). However, there may be a disconnect between the public health interest and the real-world application. In this regard, authors have pointed out that EDs are among the most common sites of missed opportunities for diagnosing HIV infections (Gardner & Haukoos, 2015) despite extensive research about ED involvement in HIV screening (Bolsekicz et al., 2015).

The potential reluctance of ED service providers to embrace HIV screening may be due to organizational and/or individual obstacles. Statements to the effect that time and resources were in short supply for engaging in screening, concerns raised about being uncomfortable with certain interactions, mention of competing priorities, and resistance to change are all issues previously documented (Arbelaez et al., 2012; Bolsekicz et al., 2015; Deblonde et al., 2010). Additionally, in this study, the screening procedure required the coordinated participation of ED players at different points in the care process, which is complex by nature. More generally, it has been recognized for years that barriers such as unfamiliarity and inertia undermine care team adherence to new recommendations (Cabana et al., 1999). Integrating HIV screening in EDs can be more difficult in these settings where the large volume of patients affords a golden opportunity for screening and translates into an already intense workload and high staff turnover. In this context, making HIV screening a routine, standardized procedure, among other more pressing demands, is a daunting challenge (Cullen et al., 2019). This notwithstanding, for some providers, screening should be

encouraged more emphatically. This highlights the need for organizational changes in order to integrate HIV screening and support a broader culture of nurse-based prevention and screening in a system perceived as overly geared towards the curative approach.

### **Nurse Contribution to Long-Term Implementation**

Nurses could play a larger role in provider-initiated screening in EDs (Leblanc et al., 2015; Phillips et al., 2014; Whalen et al., 2018). In our study, HIV screening was seen as a gratifying activity that fell within the nursing sphere of competence and as a means of motivating nursing teams. For the most part, providers deemed that the strategy could be maintained in EDs over time, although their enthusiasm for long-term implementation did wane after the trial. They mentioned collective involvement, training, and care team support as key factors essential for the successful implementation of screening, just as has been reported elsewhere (Heinert et al., 2017). Integrating screening into the routine would also be facilitated if the process were flexible. Studies have underscored that adapting the process to workload, such as offering screening only in low-flow periods, was crucial (Cullen et al., 2019; Heinert et al., 2017). Identifying a nurse champion could also be helpful to increase staff adherence (Brewster et al., 2015). The contributing factors have been widely documented in the field of implementation science (Bokhour et al., 2015). HIV screening implementation requires a gradually integrated culture of screening within EDs (Cullen et al., 2019). Further research proposing innovative ideas will be helpful to meet patient expectations more effectively and adapt screening strategies to local contexts (McNulty & Schneider, 2018).

### ***Limitations***

The views and perceptions of patients who refused to complete the DICI-VIH questionnaire and/or tested positive on the HIV rapid test were not collected. Additionally, it was not possible to accurately determine the number of patients who filled out the DICI-VIH

questionnaire during data collection periods on patient acceptability by CRN. Also, participants in the nurse sample were not precisely the same for the pre- and posttrial questionnaires, and these questionnaires could not be matched. Regarding the provider sample, the fact that the study coordinator conducted interviews could have introduced a desirability bias. However, the large selection included different categories of health professionals, resulting in various views on the screening strategy. Lastly, the qualitative findings were not presented to participants and, consequently, they did not provide feedback.

### **Implications for Practice**

In countries like France, where HIV represents a concentrated epidemic, health authorities are currently recommending a more focused approach to screening initiatives. In this context, by taking account of the barriers and facilitators documented here, which include local team support and process flexibility, and by devising innovative strategies, health systems should be able to integrate HIV screening in existing ED care processes more easily and effectively. More generally, better integration and recognition of the nursing profession's disease prevention missions, better initial nurse training in the field of public health in general and in HIV screening, in particular, are essential if screening strategies and other prevention programs are to be applied in practice and integrated over the long term.

### **Conclusion**

HIV screening strategies are being refined more and more at the international level to be epidemic and subgroup-specific. Targeted ED screening strategy evaluated in this study was perceived as acceptable and beneficial by patients and service providers who considered the strategy more appropriate than a nontargeted approach. Though providers reported barriers primarily related to organizational constraints, they felt that this strategy could be applied routinely. The next step will be to optimize and facilitate its full integration into clinical practice. Evaluating the factors that contribute to implementing an ED screening

strategy can be useful in planning HIV and other prevention programs in the same hospital settings. More generally, it also helps shed light on the role of nurses in implementing public health strategies.

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**FIGURE LEGENDS****Figures 1. Timeline of the study**

*Legend:*

*ED, Emergency department*

**Figure 2. Flow diagram**

*Legend:*

<sup>a</sup> *During five consecutive days of the intervention with data collection for the patient sample, the DICI-VIH questionnaire was offered as usual 24 hours a day.*

<sup>b</sup> *During five consecutive days of the intervention with data collection for the patient sample, the questionnaire on the acceptability of the screening process was offered from 9 a.m. to 5 p.m.*

**Figure 3. Main findings of nurse pre-/posttrial questionnaires**

*Figure Legend*

*Range of 1 to 5 corresponds to the following responses starting from the left: “Strongly disagree” (1), “Disagree” (2), “Do not disagree or agree” (3), “Agree” (4), “Strongly agree” (5). Bar graphs are centered on “Do not disagree or agree”.*

*In total: n=271; questions 4, 5 and 6: n=269 (2 cases of missing data); question 7: n=268 (3 cases of missing data).*

*Results did not differ between the pre- and posttrial groups for questions 1, 2, 3, 4, 5, 6 (NS) but differ for question 7: 72.7% pretrial, 40.8% posttrial (OR: 0.59; 95% CI: 0.37-0.92, posttrial versus pretrial questionnaires).*



**DICl-VIH intervention period**

- 8 EDs



**Patient sample**

- Questionnaires
- 4 EDs, 5 days per ED during intervention period



**Nurse sample**

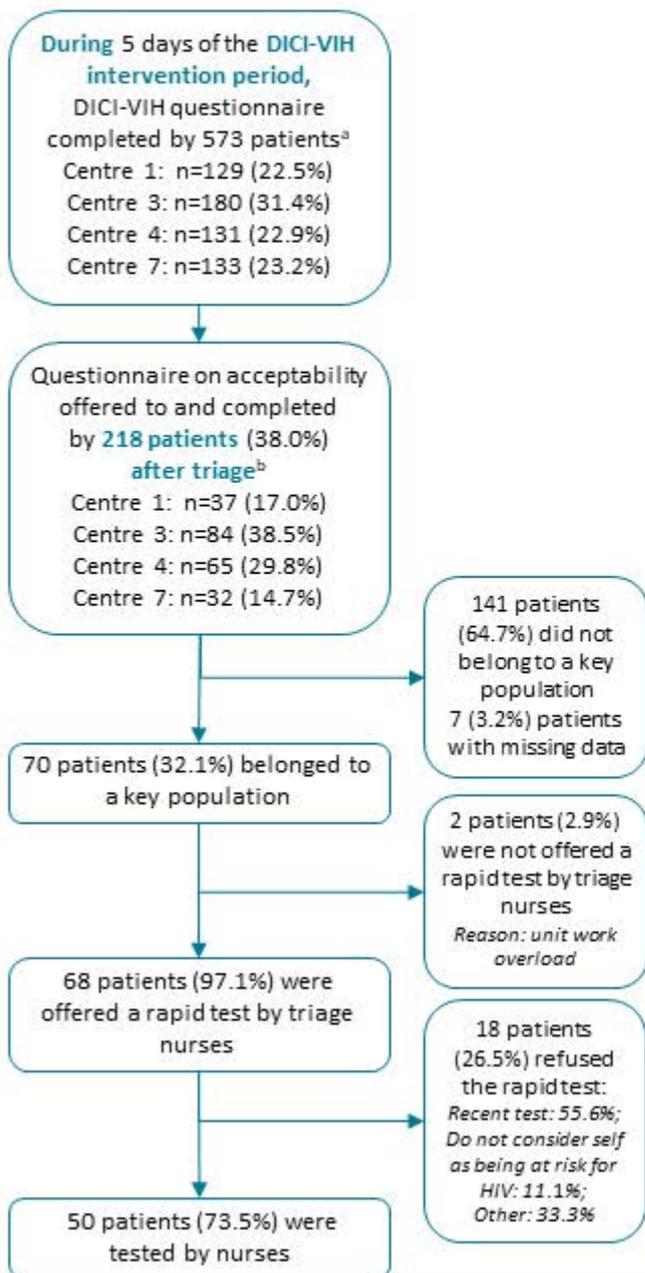
- Questionnaires
- 8 EDs, pre- and post-intervention period



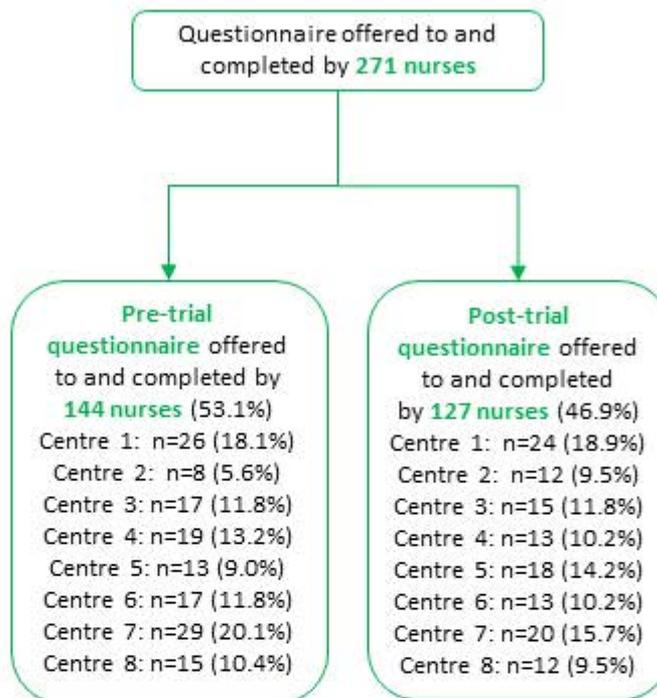
**Provider sample**

- Interviews
- 8 EDs, end of intervention period

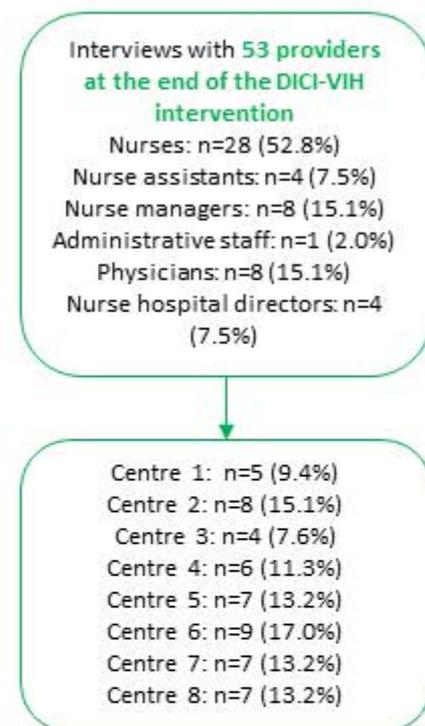
## PATIENT SAMPLE

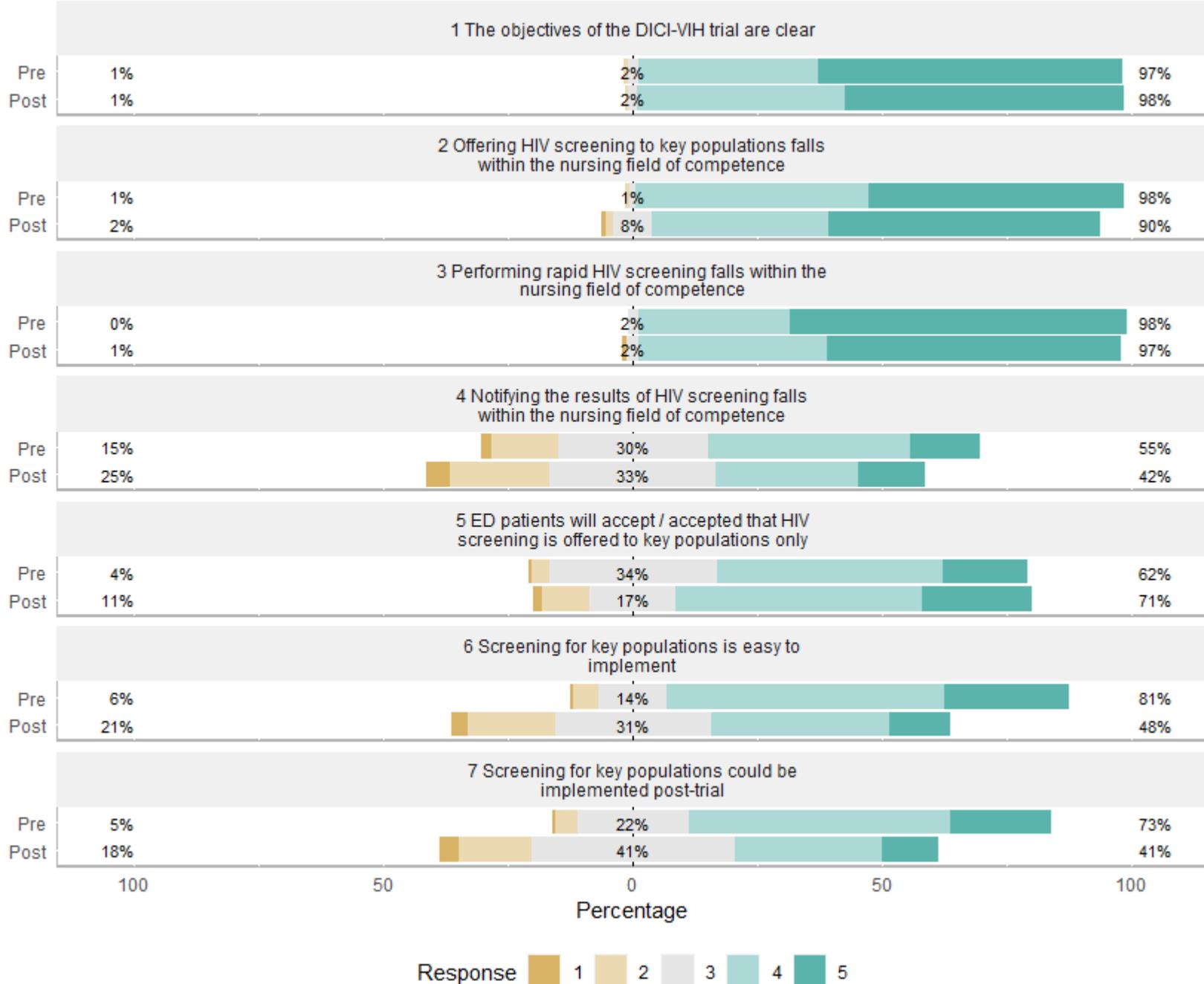


## NURSE SAMPLE



## PROVIDER SAMPLE





**Table 1***Nurse and provider characteristics*

<b>Nurse characteristics</b>	<b>Pretrial questionnaires n = 144</b>	<b>Posttrial questionnaires n = 127</b>
Female <sup>a</sup>	108 (76.6)	96 (76.2)
Age, in years <sup>b</sup>	30.0 (26.0 - 35.0)	29.5 (26.0 - 35.0)
Years of work experience since graduation <sup>c</sup>	5.7 (3.2 - 9.6)	5.2 (3.2 - 9.7)
Years of work experience in present ED <sup>d</sup>	3.7 (2.0 - 6.1)	3.8 (2.1 - 5.8)
Previously offered and performed rapid HIV testing <sup>e</sup>	84 (60.0)	76 (60.3)
Previously participated in a study of nontargeted HIV screening in EDs <sup>f</sup>	57 (40.7)	51 (40.8)
Self-assessed participation in the DICI-VIH trial		
None		8 (6.3)
Low		25 (19.8)
Moderate		70 (55.6)
High		20 (15.9)
Very high		3 (2.4)
<b>Provider characteristics</b>	<b>n = 53</b>	
Female	40 (75.5)	
Age, in years	37.0 (31.0-44.0)	
Profession		
Nurse	28 (52.8)	
Nurse assistant	4 (7.5)	
Nurse manager	8 (15.1)	
Administrative staff	1 (2.0)	
Physician	8 (15.1)	
Nurse hospital director	4 (7.5)	
Years of work experience since initial graduation <sup>g</sup>	13.0 (6.00-23.0)	
Years of work experience in present ED <sup>g,h</sup>	18.0 (10.0-23.0)	
Years of work experience in all EDs <sup>g,h</sup>	34 (69.4)	
Previously participated in HIV screening in ED <sup>h,i</sup>	26 (54.2)	
Interested in prevention and public health topics	42 (79.2)	
Interested in HIV topic <sup>j</sup>	37 (71.2)	

*Note.* ED = emergency department. DICI-VIH (trial) = Dépistage Infirmier Ciblé du VIH (trial). Data are presented as numbers (%) or medians (first quartile-third quartile) when indicated.

<sup>a</sup> n=267 (4 cases of missing data), inter-group comparison (pre- and posttrial questionnaires): p=0.91.

<sup>b</sup> n=265 (6 cases of missing data), p=0.97.

<sup>c</sup> n=266 (5 cases of missing data), p=0.89.

<sup>d</sup> n=254 (17 cases of missing data), p=0.78.

<sup>e</sup> n=266 (5 cases of missing data), p=0.64.

<sup>f</sup> n=265 (6 cases of missing data), p=0.69.

<sup>g</sup> n=49 (4 cases of missing data).

<sup>h</sup> Data collected from ED staff only.

<sup>i</sup> n=48 (5 cases of missing data).

<sup>j</sup> n=52 (1 case of missing data).

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## **eSupplements**

**eSupplement 1** Patient questionnaire on the acceptability of the HIV screening strategy

**eSupplement 2** Nurse pre-trial questionnaire on the acceptability of the HIV screening strategy

**eSupplement 3** Results from the patient questionnaire

## eSupplement 1 Patient questionnaire on the acceptability of the HIV screening strategy

Dear Sir/Madam,

You have just finished completing a questionnaire as part of the DICI-VIH study presently being conducted in this emergency department. May we ask you a few questions about it?

The DICI-VIH team

	Strongly disagree	Disagree	Do not disagree or agree	Agree	Strongly agree
1. How much do you agree or disagree with the following statement: I am interested in participating in a study of HIV screening.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Were you put off by any of the questions you were asked?	Yes <input type="checkbox"/>	No <input type="checkbox"/>			
	Q.3 (Origin)	Q.4 (Partner origin)	Q.5 (Injection drug use)	Q.6 (More than 5 partners)	Q.7 (Male-to-male sexual contact)
a. <b>IF YES</b> , which ones? (more than one answer accepted)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. In your opinion, would it be appropriate for the nurse at the reception to ask you these questions out loud?	Yes <input type="checkbox"/>	No <input type="checkbox"/>			
4. In your opinion, would it be appropriate for the doctor who examined you to ask you these questions out loud?	Yes <input type="checkbox"/>	No <input type="checkbox"/>			
5. Did you undergo rapid HIV screening?	Yes <input type="checkbox"/>	No <input type="checkbox"/>			
a. <b>IF NO</b> , would you have liked to have been offered rapid screening?	<input type="checkbox"/>	<input type="checkbox"/>	Not applicable (refused screening) <input type="checkbox"/>		
b. <b>IF YES</b> (screening performed):	Yes	No			
i. Are you all right with rapid screening being offered by a nurse? If no, why:	<input type="checkbox"/>	<input type="checkbox"/>			
	.....				
	.....				
	Strongly disagree	Disagree	Do not disagree or agree	Agree	Strongly agree
ii. How much do you agree or disagree with the following statement: The offer embarrassed me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Too long	Rather long	Acceptable		
iii. How did the wait time for the results seem to you?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
	Strongly disagree	Disagree	Do not disagree or agree	Agree	Strongly agree
iv. How much do you agree or disagree with the following statement: Waiting for the test results made me overly anxious.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
v. Are you all right with a nurse notifying the results? If the results are negative?	Yes <input type="checkbox"/>	No <input type="checkbox"/>			

If the results are positive?

vi. If you had not been screened today in the emergency department, would you have gone for screening elsewhere in the next few months?

Definitely not      Probably not      Maybe yes      Probably yes

Strongly disagree      Disagree      Do not disagree or agree      Agree      Strongly agree

6. How much do you agree or disagree with the following statement: HIV screening should be offered in emergency departments to key populations.

a. If strongly disagree or disagree, why?

.....  
.....

7. HIV self-screening tests are now available. Would you use them at home?

Yes      No

8. Do you need to learn more about HIV, how it is transmitted, and where to go for screening?

Yes      No

9. Do you have any comments you would like to make?

.....  
.....

## eSupplement 2 Nurse pre-trial questionnaire on the acceptability of the HIV screening strategy

Dear Sir/Madam,

The DICI-VIH study will be conducted in your department. We would like to ask you a few questions to find out your views on the study. To this end, please complete this brief questionnaire. Thank you. The DICI-VIH team

	Strongly disagree	Disagree	Do not disagree or agree	Agree	Strongly agree
1. The objectives of the DICI-VIH trial are clear.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Offering HIV screening to key populations falls within the nursing field of competence.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Performing rapid HIV screening falls within the nursing field of competence.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Notifying the results of HIV screening, whether negative or positive, falls within the nursing field of competence.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. ED patients will accept that HIV screening is offered to key populations only.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Nurse-driven HIV screening for key populations is easy to implement.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Nurse-driven HIV screening for key populations could be implemented in your emergency department post-trial as routine practice.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Have you ever offered and performed rapid HIV screening?	Yes <input type="checkbox"/>	No <input type="checkbox"/>			
9. Did you participate in the previous study of nontargeted HIV screening?	Yes <input type="checkbox"/>	No <input type="checkbox"/>			
If yes, were you involved in performing the tests?	Yes <input type="checkbox"/>	No <input type="checkbox"/>			
10. Are you?	Male <input type="checkbox"/>	Female <input type="checkbox"/>			
11. How old are you? (in years)		Year --			
12. What year did you graduate?		Year ----			
13. When did you join this emergency department?	Month --	Year ----			
14. Do you have any comments you would like to make about the study?	.....				

### eSupplement 3 Results from the patient questionnaire on the acceptability of the strategy

Results from the patient questionnaire	n=218
Question 1: I am interested in participating in a study of HIV screening:	
Strongly disagree	5 (2.3)
Disagree	6 (2.8)
Do not disagree or agree	16 (7.3)
Agree	51 (23.4)
Strongly agree	140 (64.2)
Question 2: Were you put off by any of the questions you were asked? <sup>a</sup>	
Yes	12 (5.5)
If yes, which ones?	
Partner origin in past 10 years	2 (16.7)
More than 5 partners in past year	5 (41.7)
Male-to-male sexual contact once in life	6 (50.0)
Question 3: Would it be appropriate for the nurse at the reception to ask you these questions out loud? <sup>a</sup>	
Yes	189 (87.1)
Question 4: Would it be appropriate for the doctor who examined you to ask you these questions out loud? <sup>a</sup>	
Yes	200 (92.2)
Question 5: Did you undergo rapid HIV screening?	
Yes	50 (23.4)
If no, would you have liked to have been offered rapid screening? <sup>b</sup>	
Yes	58 (35.1)
If yes, are you all right with rapid screening being offered by a nurse?	
Yes	50 (100.0)
If yes, the offer embarrassed me:	
Strongly disagree	0 (0.0)
Disagree	1 (2.0)*
Do not disagree or agree	2 (4.0)
Agree	5 (10.0)
Strongly agree	42 (84.0)
If yes, how did the wait time for the results seem to you? <sup>c</sup>	
Too long	2 (4.1)
Rather long	1 (2.0)
Acceptable	46 (93.9)
If yes, waiting for the screening results made me overly anxious <sup>c</sup>	
Strongly disagree	23 (46.9)
Disagree	6 (12.2)
Do not disagree or agree	6 (12.2)
Agree	11 (22.5)
Strongly agree	3 (6.1)
If yes, are you all right with a nurse notifying results if negative? <sup>d</sup>	
Yes	46 (95.8)
If yes, are you all right with a nurse notifying results if positive? <sup>c</sup>	
Yes	40 (81.6)
If yes, if you had not been screened today in the emergency department, would you have gone for screening elsewhere in the next few month? <sup>d</sup>	
Definitely not	10 (20.8)
Probably not	6 (12.5)
Probably yes	8 (16.7)
Definitely yes	24 (50.0)

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Question 6: HIV screening should be offered in emergency departments to key populations.<sup>e</sup>

Strongly disagree	0 (0.0)
Disagree	5 (2.3)
Do not disagree or agree	20 (9.3)
Agree	65 (30.1)
Strongly agree	126 (58.3)

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Question 7: Would you use HIV self-screening tests at home?<sup>f</sup>

Yes	121 (56.3)
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Question 8: Do you need to learn more about HIV, how it is transmitted, and where to go for screening?<sup>a</sup>

Yes	84 (38.7)
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*Data are presented as numbers (%) or medians (first quartile-third quartile) when indicated.*

<sup>a</sup> *n=217 (data missing for one respondent)*

<sup>b</sup> *n=165 (data missing for three respondents)*

<sup>c</sup> *n=49 (data missing for one respondent)*

<sup>d</sup> *n=48 (data missing for two respondents)*

<sup>e</sup> *n=216 (data missing for two respondents)*

<sup>f</sup> *n=215 (data missing for three respondents)*